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Nakaoka

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[54] **PHOTOGRAPHIC PRINTER**

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[73] Assignee: **Noritsu Koki, Co., Ltd**, Wakayama-ken, Japan

[21] Appl. No.: **08/597,431**

[22] Filed: **Feb. 8, 1996**

[30] **Foreign Application Priority Data**

Feb. 8, 1995 [JP] Japan 7-020378

[51] **Int. Cl.**[6] **G03B 27/52**

[52] **U.S. Cl.** **355/40**; 355/41

[58] **Field of Search** 355/40, 41, 42, 355/43, 75

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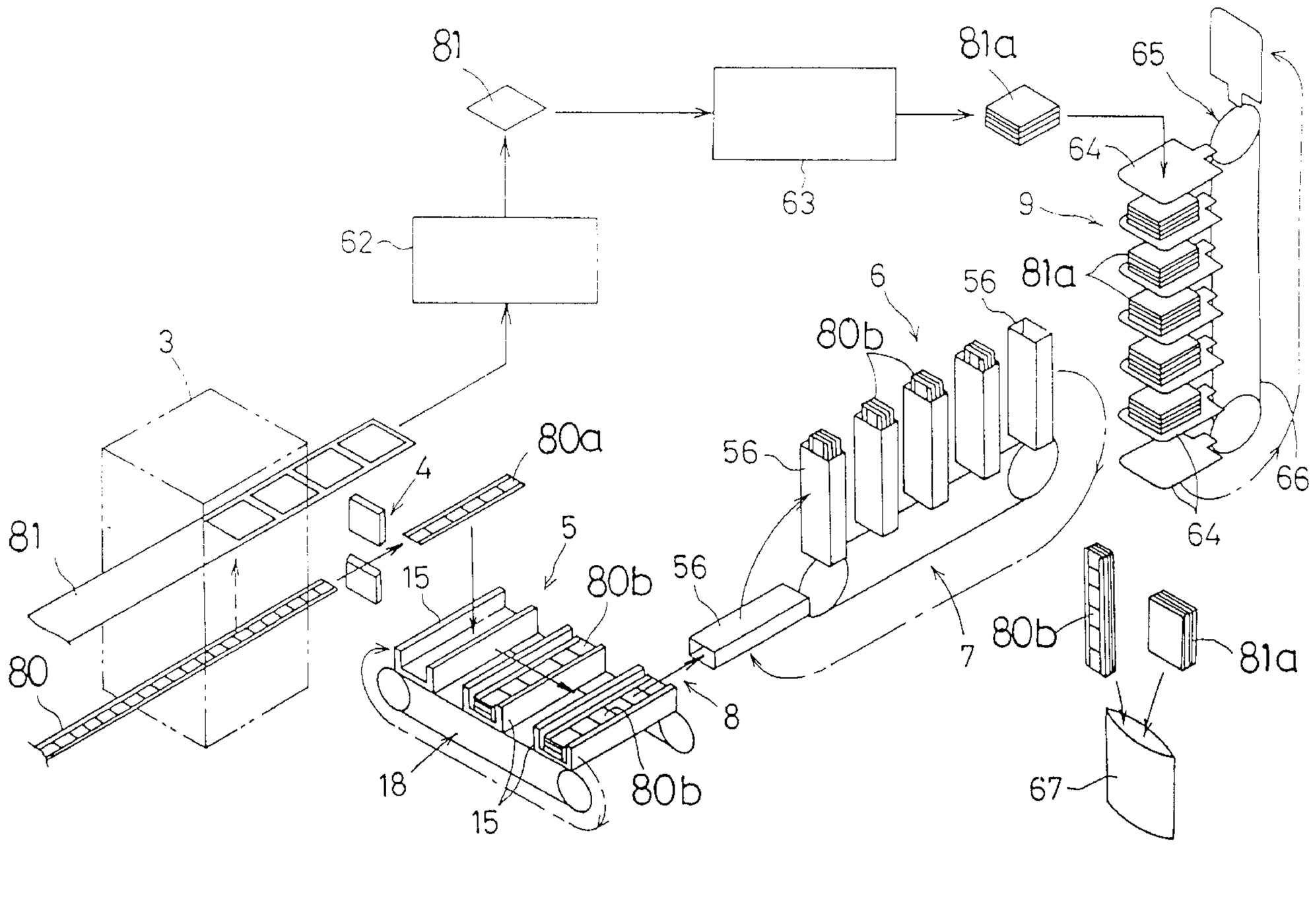
Primary Examiner—R. L. Moses
Assistant Examiner—Shival Virmani
Attorney, Agent, or Firm—Fulbright & Jaworski

[57] **ABSTRACT**

A photographic printer has an exposure station for exposing and printing images of photographic film on printing paper, a cutter for cutting the photographic film, after a printing process, to film pieces of a length having a predetermined number of frames, and cartridges for collecting the film pieces as sorted into separate orders. Each cartridge stores a group of film pieces stacked one upon the other, and transports the group of film pieces to a film outlet.

11 Claims, 9 Drawing Sheets



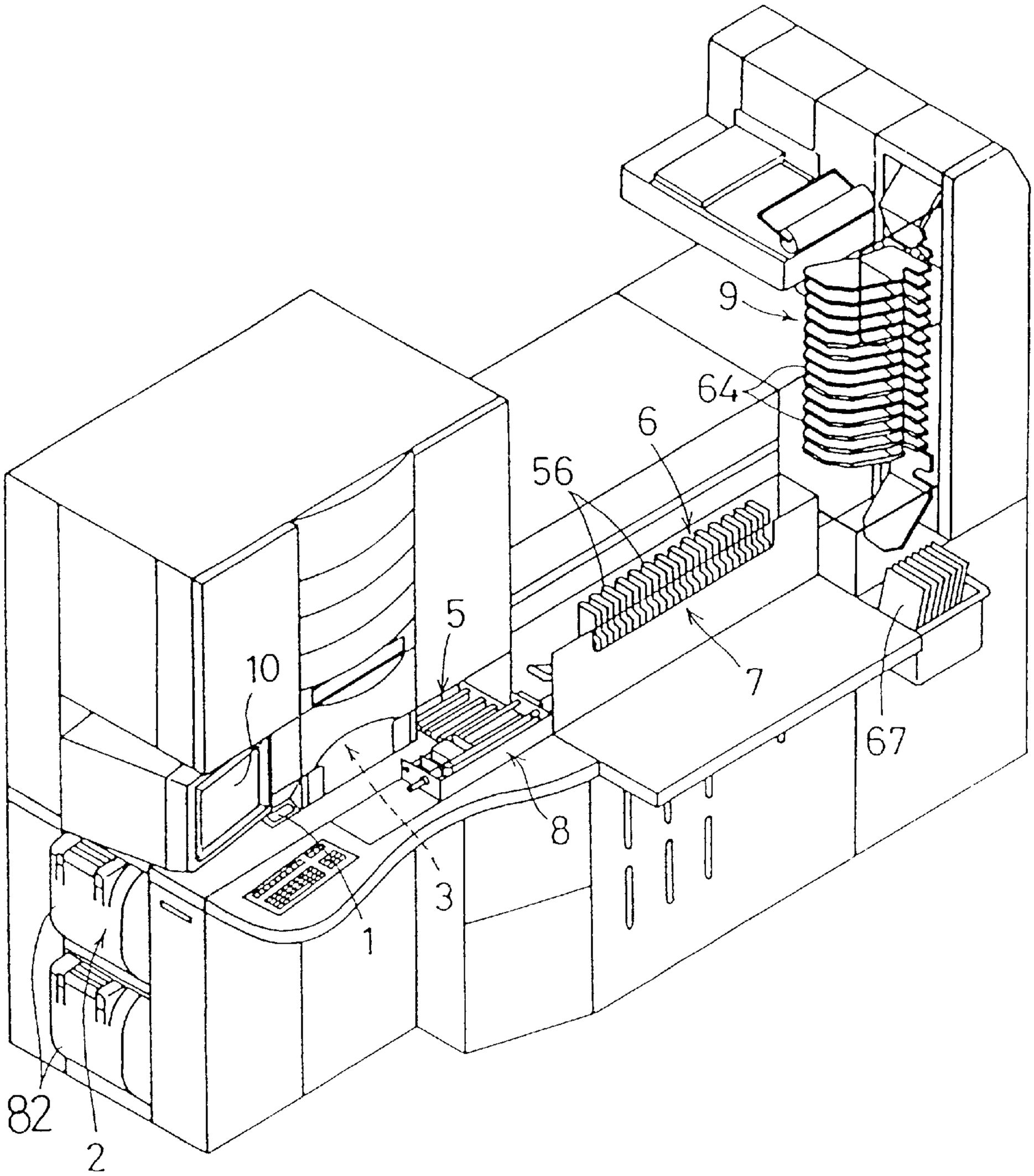
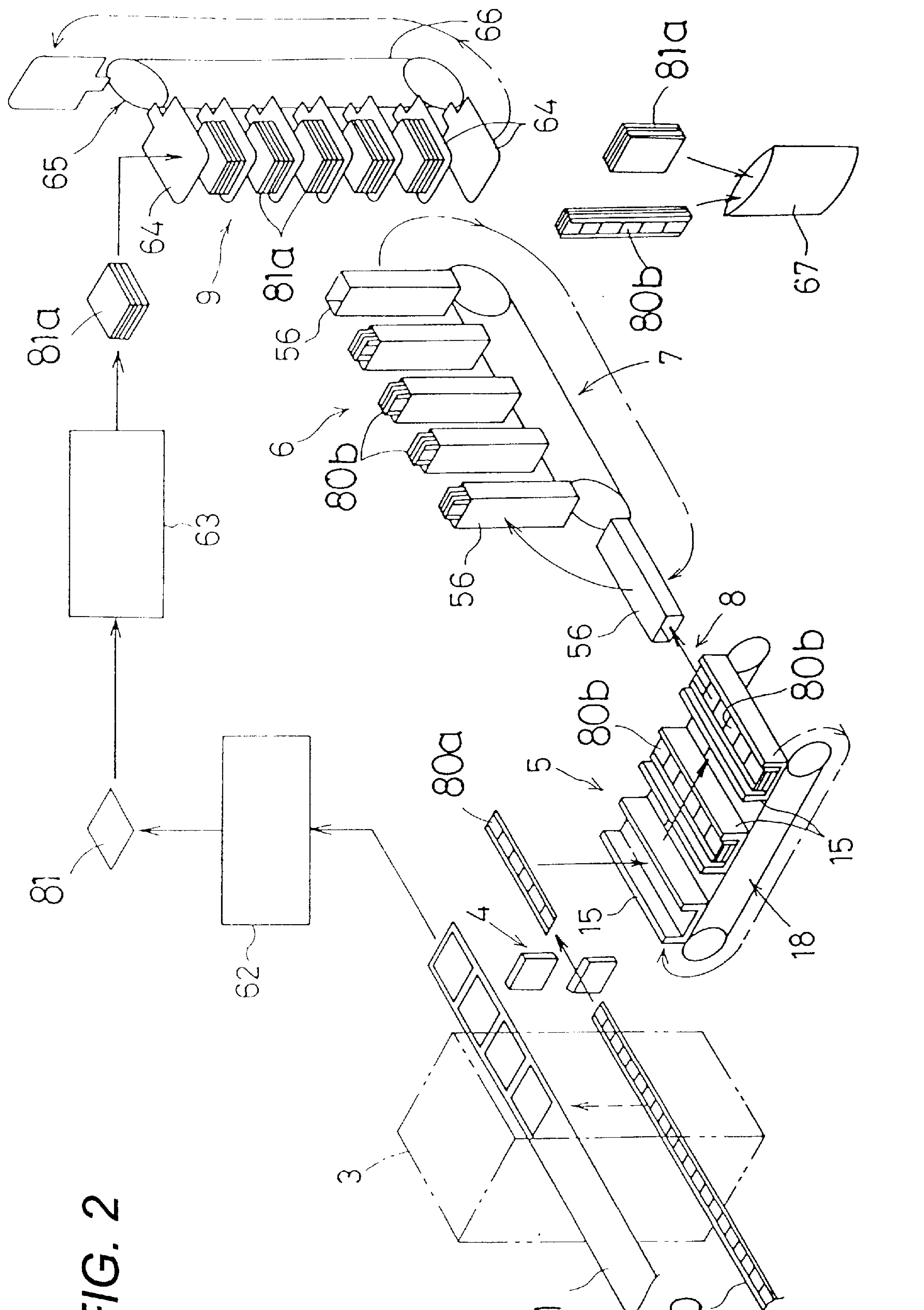


FIG. 1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9
81a
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6
80b
7
67
80b
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56
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80b
80b
5
80a
15
15
18
4
3
81
80
81
62
63

FIG. 2

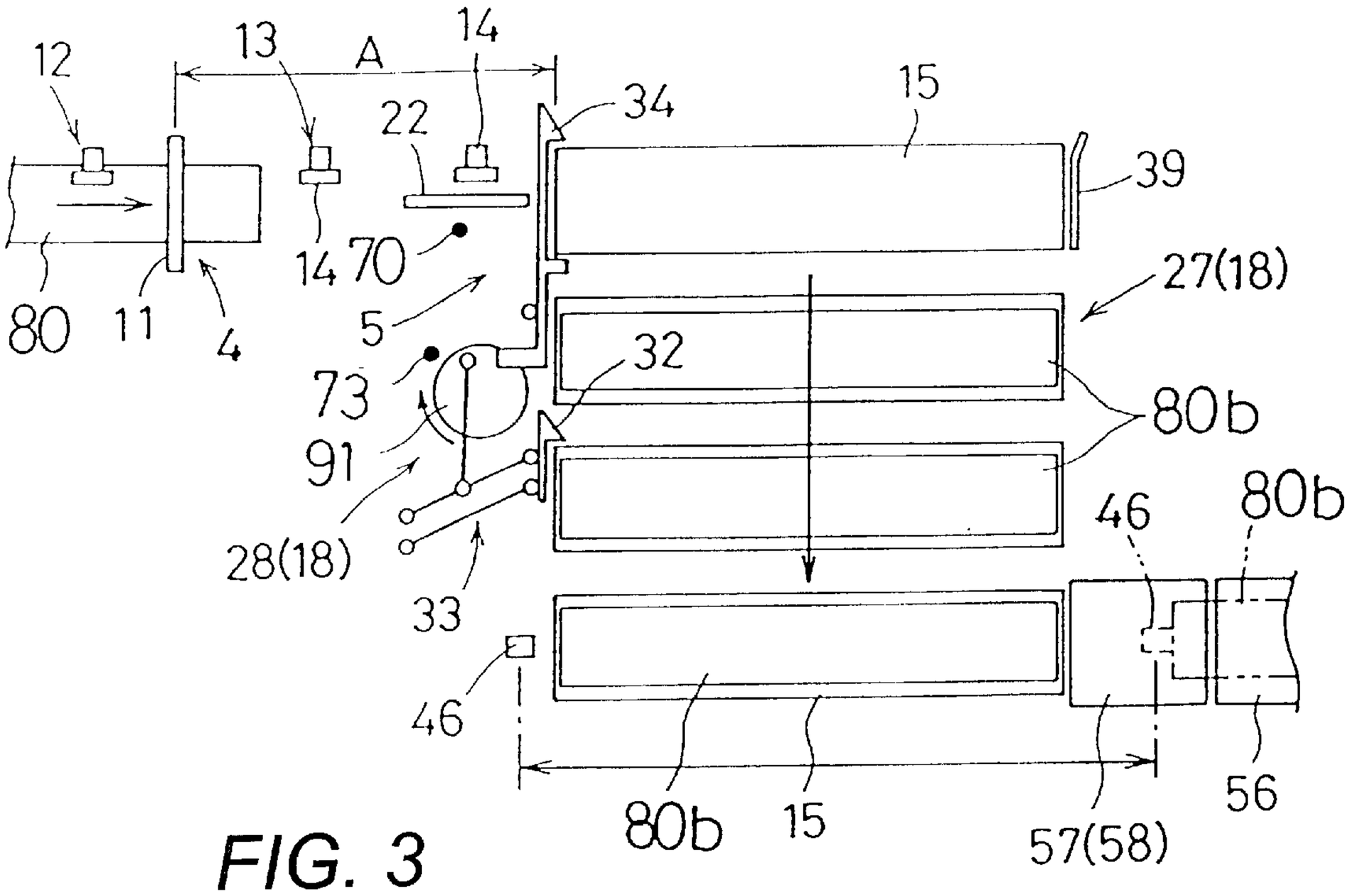
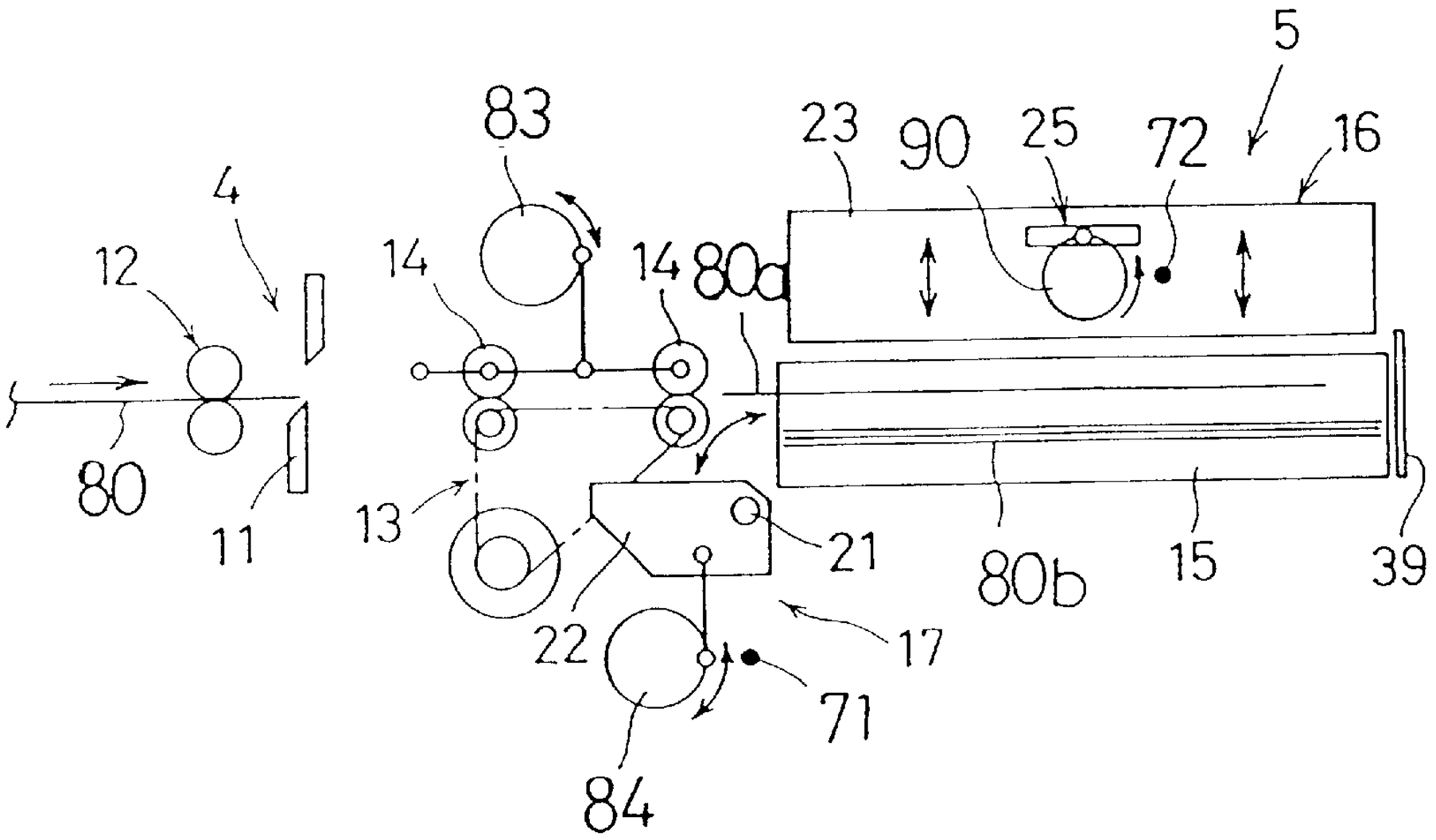

12
13
A
14
22
34
15
39
14
70
27(18)
80
11
4
5
32
73
80b
91
28(18)
80b
46
33
46
80b
15
57(58)
56

FIG. 3


5
83
23
90
25
72
16
4
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14
80a
12
80
11
13
21
80b
15
39
22
17
71
84

FIG. 4

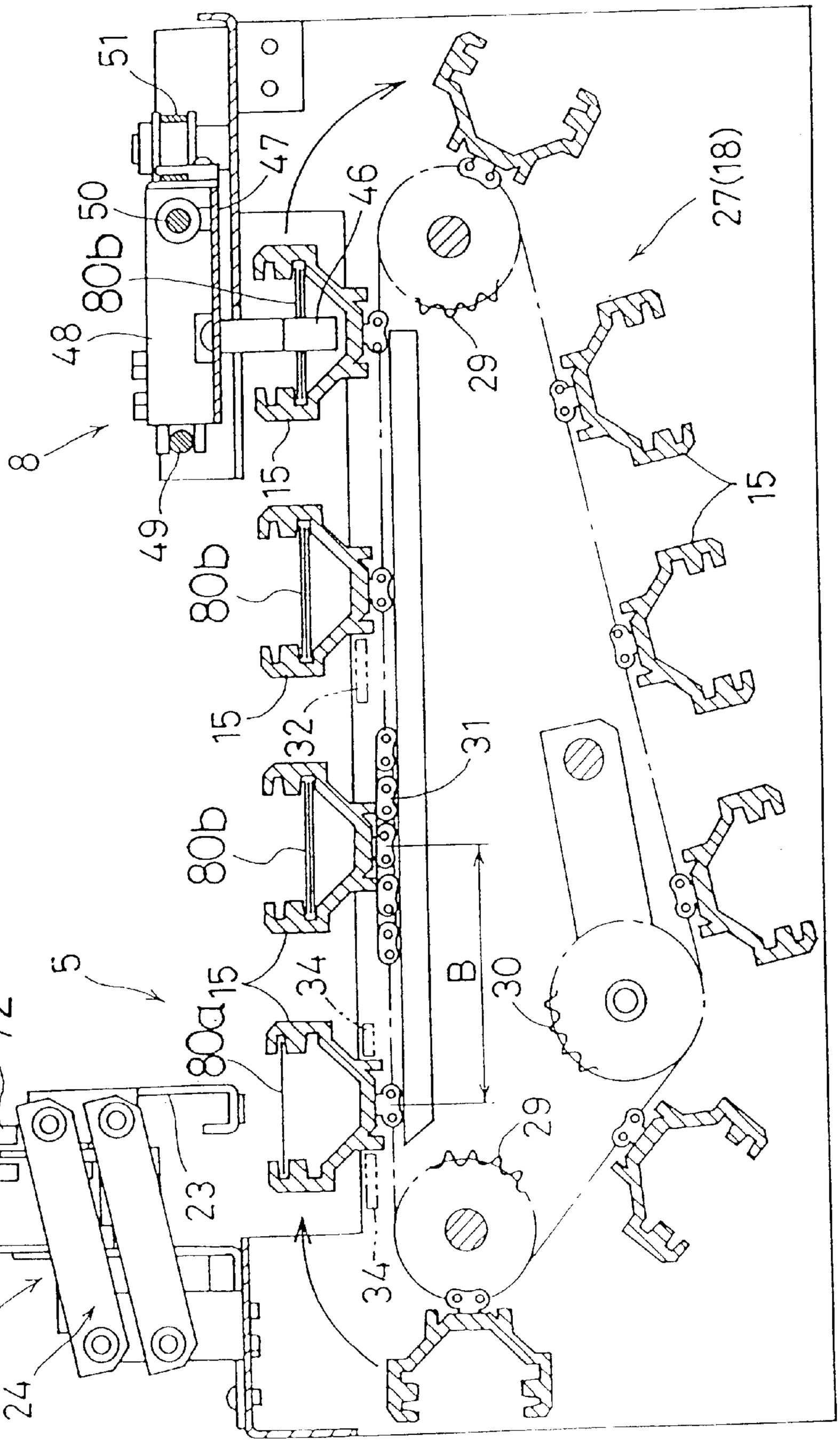

51
47
46
27(18)
50
80b
48
29
8
15
49
80b
15
80b
32
31
5
34
B
30
72
80a
15
29
23
34
16
24

FIG. 5

FIG. 6

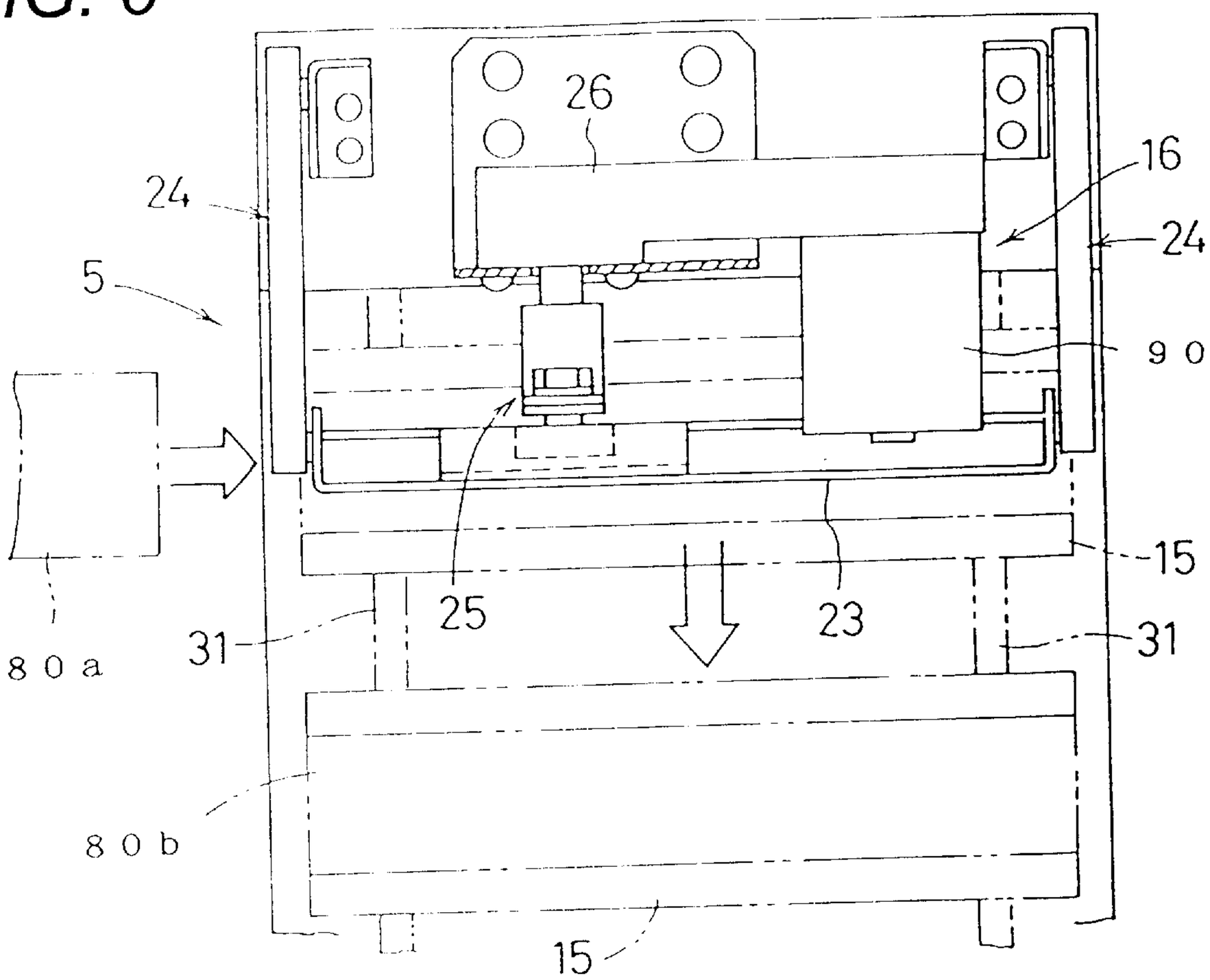


FIG. 7a

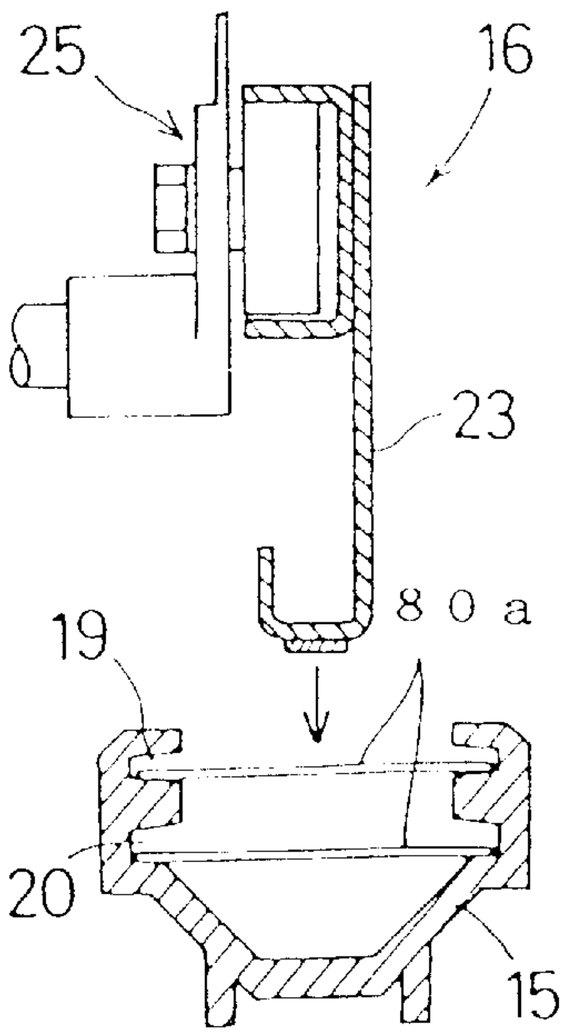


FIG. 7b

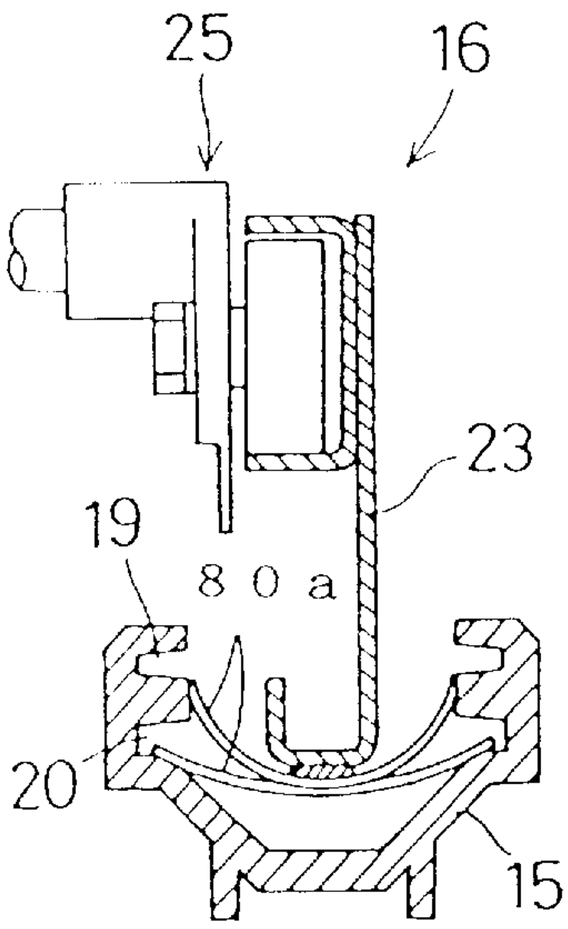
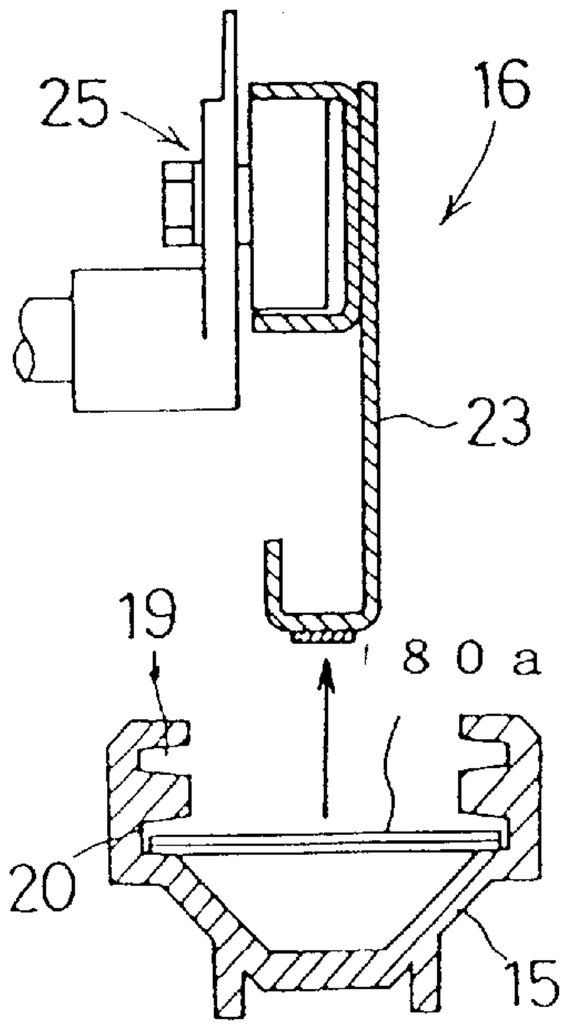


FIG. 7c



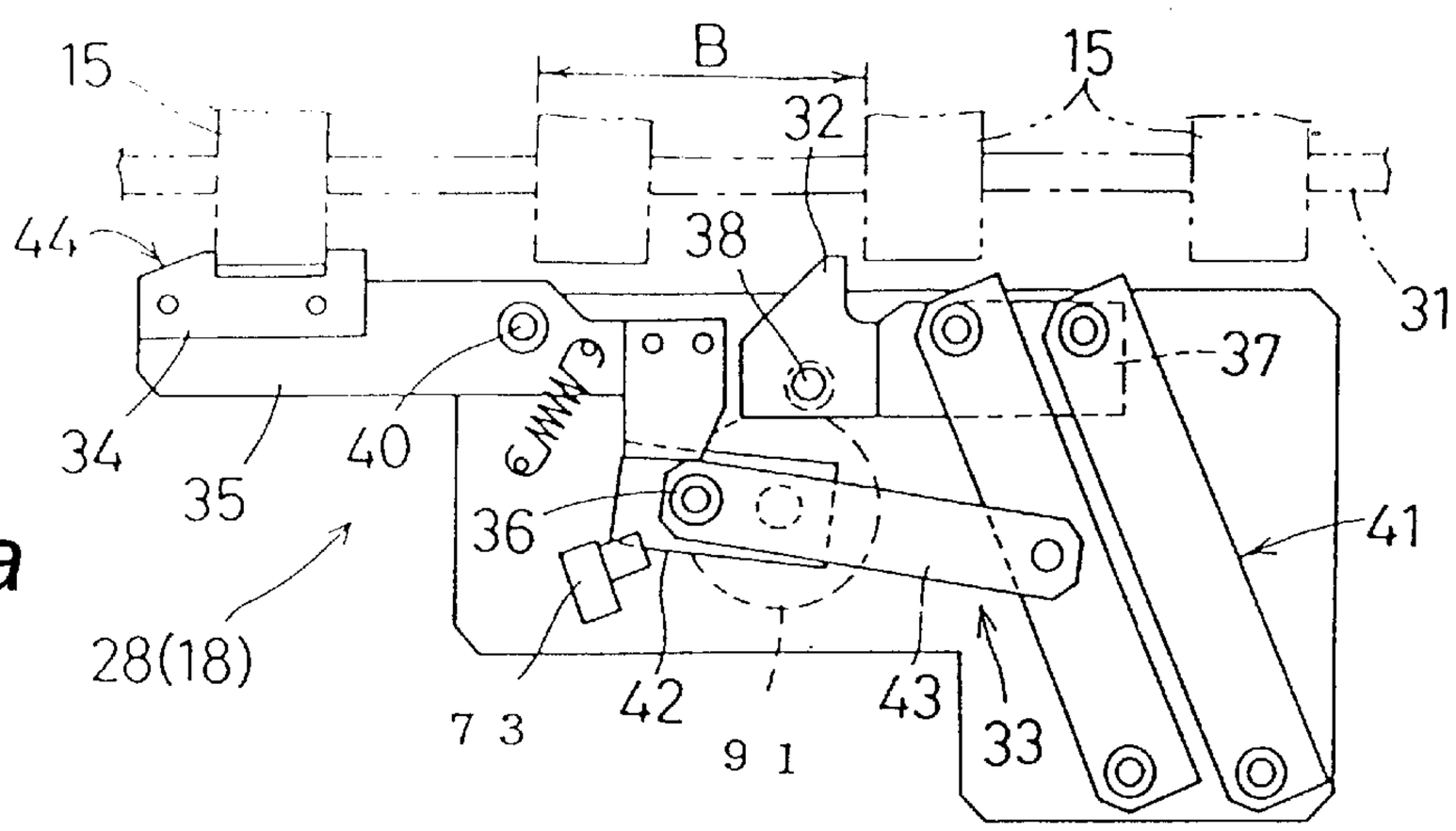


FIG. 8a

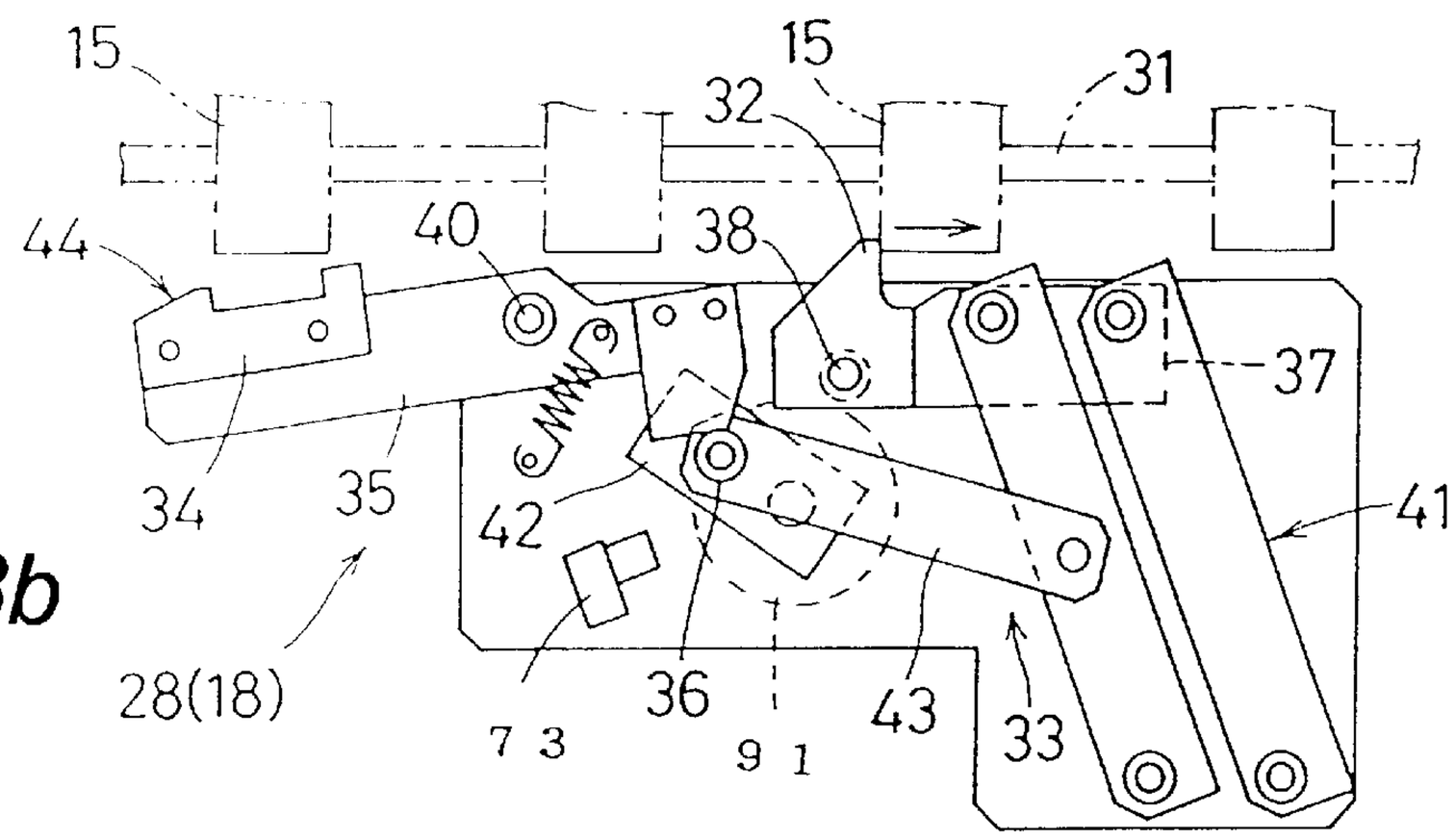


FIG. 8b

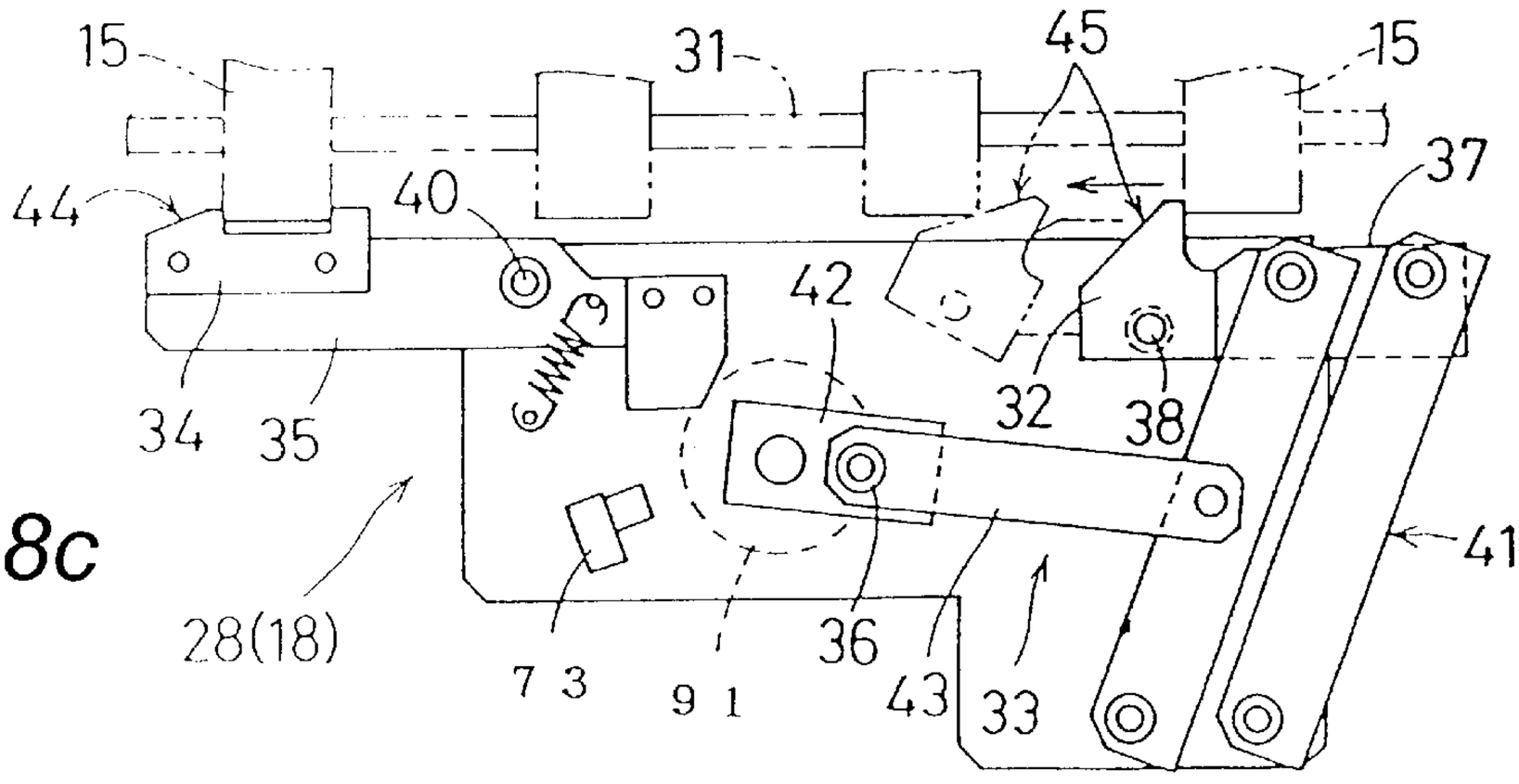


FIG. 8c

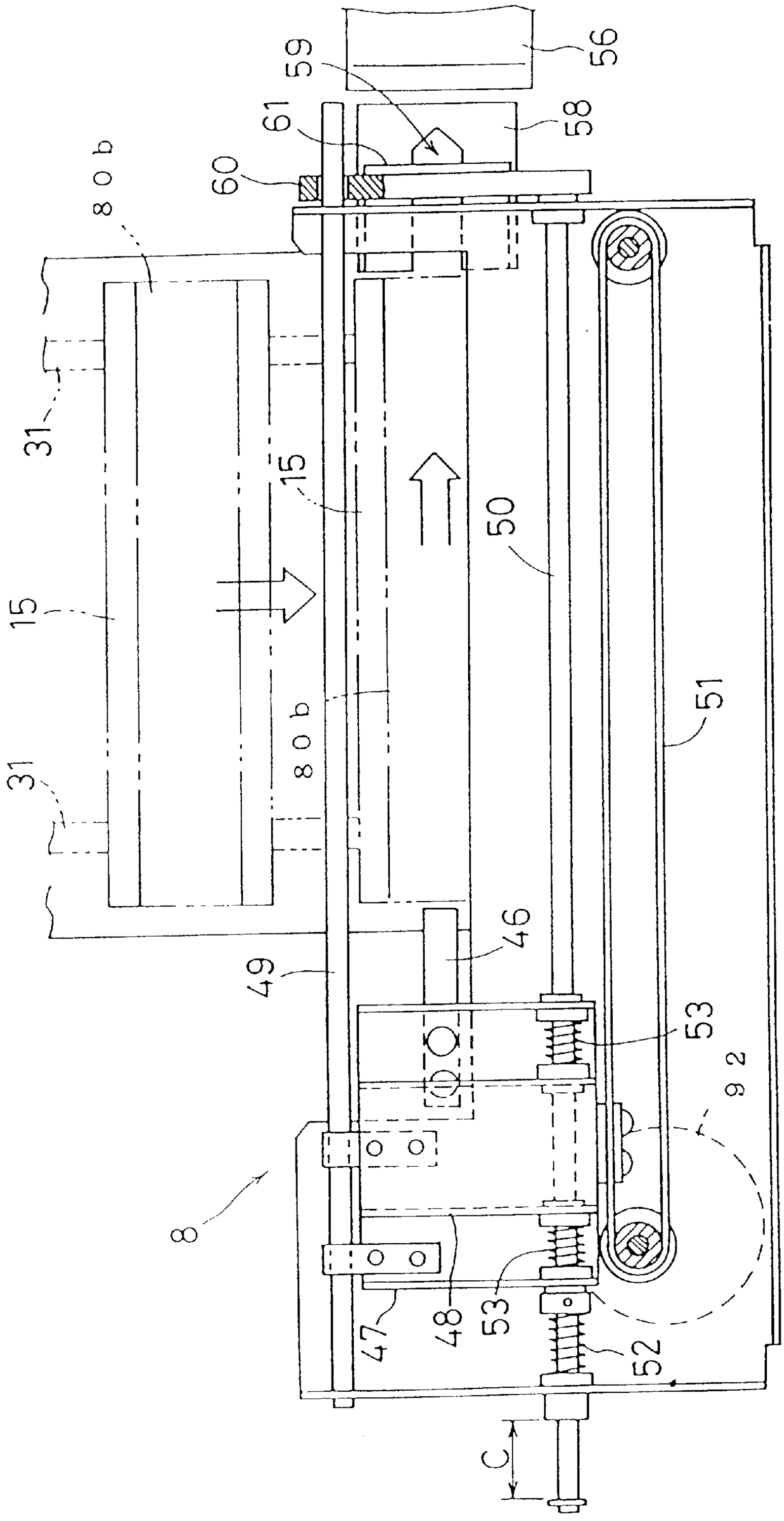
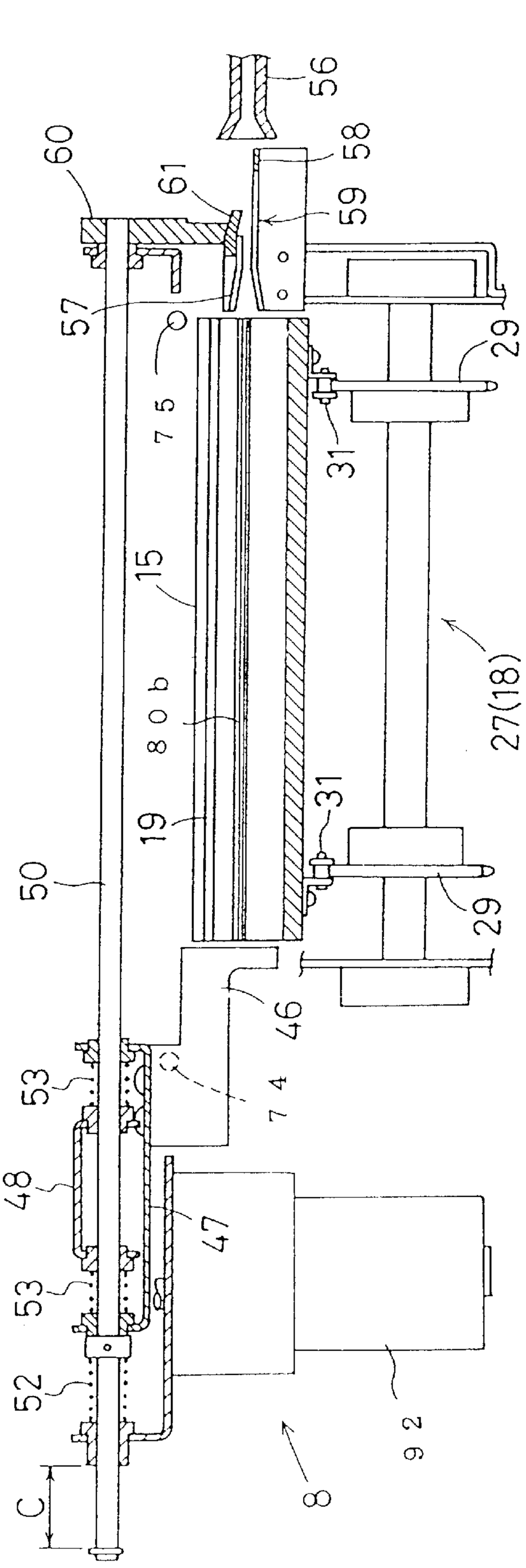


FIG. 9

FIG. 10a



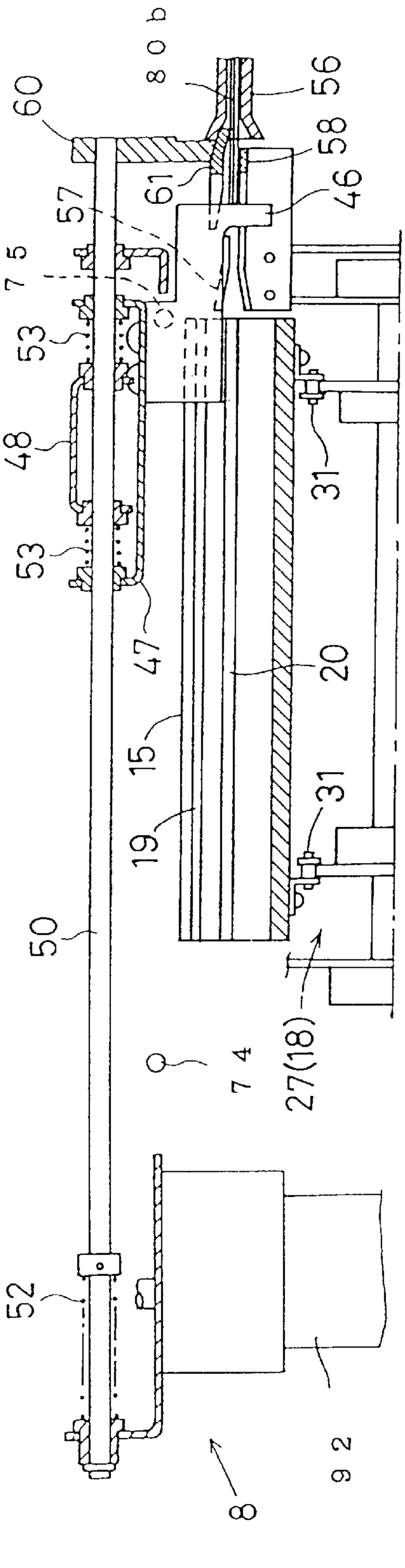


FIG. 10b

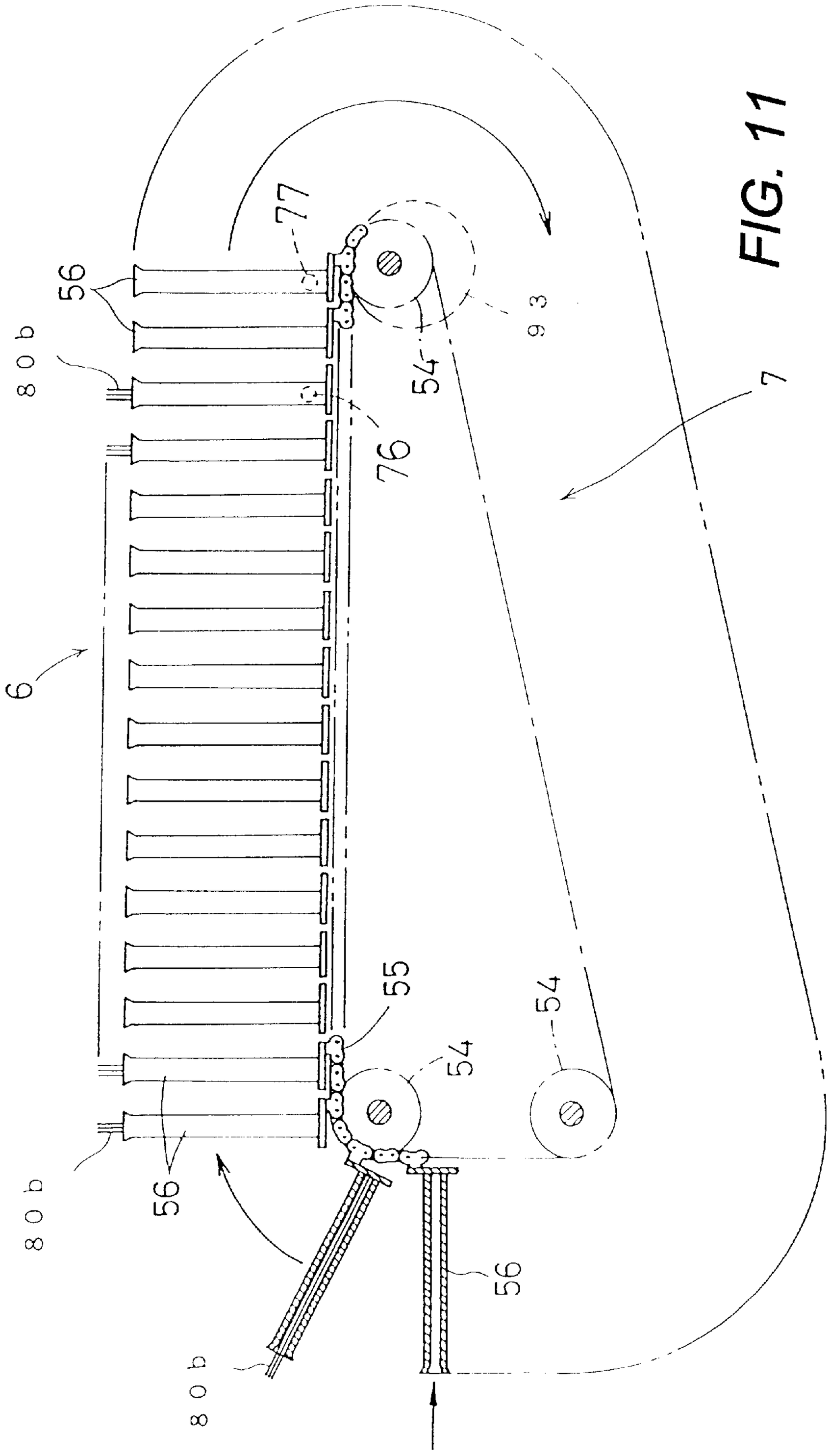


FIG. 11

PHOTOGRAPHIC PRINTER

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to a photographic printer having an exposing device for printing images of photographic film on printing paper.

2. Description of the Related Art

In operating a photographic printer as noted above, it is necessary to arrange photographic film after printing processes according to orders from clients. In a conventional practice of arranging processed photographic film according to orders from clients, photographic film in one order is cut to a plurality of film pieces of a length having a predetermined number of frames, and a storing device is used to place these film pieces relating to one order into a series of negative sheets. Thus, the film pieces are arranged by a unit of negative sheet series for each order (see the Japanese patent application laid open under No. 6-242590, for example).

The above conventional practice involves troublesome operations for keeping the negative sheets and replenishing the photographic printer with the negative sheets, and for managing and operating the photographic printer.

SUMMARY OF THE INVENTION

The present invention has been made having regard to the state of the art noted above, and its object is to provide a photographic printer requiring a reduced trouble of management and operation, which is achieved by an improved sorting device for sorting cut film pieces according to each order.

The above object is fulfilled, according to the present invention, by a photographic printer comprising a cutting device for cutting photographic film, after a printing process, to film pieces of a length having a predetermined number of frames, and a film collecting device for collecting the film pieces as sorted into separate orders. The film collecting device includes, for example, cartridges each for collecting the film pieces stacked vertically.

With this construction, photographic film after a printing process is cut to film pieces of a length having a predetermined number of frames. These film pieces are collected as sorted into separate orders. In this way, the film pieces are arranged according to orders without using negative sheets, whereby the photographic printer requires a reduced trouble of management and operation.

Preferably, the photographic printer further comprises a film transport device for transporting a group of film pieces in each order collected by the film collecting device to a film outlet in collected state. The film transport device may include, for example, a plurality of buckets for receiving the film pieces inserted in a longitudinal direction thereof, an endless chain for supporting the buckets connected thereto at fixed intervals, and a motor for intermittently driving the endless chain.

With this construction, the film outlet for dispensing a group of film pieces in each order may be disposed in a position suited for handling and arranging groups of film pieces collected.

Preferably, the photographic printer further comprises a moving device for moving the film pieces cut by the cutting device, in a direction of film width, and the film transport device has a transport starting position staggered from a cutting position of the cutting device in the direction of film width.

With this construction, the film pieces cut by the cutting device are moved in the direction of film width, and then transported to the film outlet in a stacked state. This construction provides an increased freedom for arranging the cutting device and film transport device, thereby facilitating arrangement thereof.

The film transport device may be constructed to transport the film pieces in a plurality of groups arranged on a transport path.

Since the film pieces are successively transported as arranged in a plurality of groups, the film transport device may be utilized more efficiently than where each group of film pieces is transported by a separate transporting step.

Preferably, the photographic printer further comprises a printing paper collecting device for collecting, as sorted into separate orders, the printing paper printed at the exposure station and then developed, and the film transport device is arranged to transport the film pieces toward a position adjacent the printing paper collecting device.

With this construction, a group of film pieces collected by the film collecting device is transported toward a position adjacent a group of printing paper in one order collected in relation to that group of film pieces. This arrangement facilitates an operation to associate the group of film pieces and the group of printing paper relating to the same order.

Other features and advantages of the invention will be apparent from the following description of a preferred embodiment of the invention, as illustrated in the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a perspective view showing an outward appearance of a photographic printer according to the present invention.

FIG. **2** is a schematic view showing a sequence of processing photographic film and printing paper.

FIG. **3** is a schematic plan view of the photographic printer.

FIG. **4** is a schematic side view of the photographic printer.

FIG. **5** is a sectional view of the photographic printer.

FIG. **6** is a plan view of the photographic printer.

FIG. **7** is an explanatory sectional view showing operation of a collecting device.

FIG. **8** is an explanatory plan view showing operation of a cartridge moving device.

FIG. **9** is a plan view of a film transfer device.

FIG. **10** is an explanatory side view showing operation of the film transfer device.

FIG. **11** is a side view of a film transport device.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

A photographic printer according to the present invention has a construction as shown in FIGS. **1** and **2**. A series of developed photographic film **80** corresponding to each order from a client is fed into the photographic printer through a film inlet **1**. A roll of printing paper **81** in a magazine **82** is loaded in a printing paper section **2**. The printer also includes an exposure station **3** for printing negative images of the film **80** on the printing paper **81**. A cutting unit **4** cuts the film **80** after a printing process to film pieces **80***a* of a length having a predetermined number of frames. A film collecting device

5 collects cut film pieces **80***a* as classified according to orders from clients. A group of film pieces **80***b* collected by the film collecting device **5** is transported in collected state to a film outlet **6** by a film transport device **7**. The film group **80***b* collected by the film collecting device **5** is transferred to the film transport device **7** by a film transfer device **8**. A printing paper collector **9** collects, as classified according to the orders, the printing paper **81** developed after being printed at the exposure station **3**. The above components of the printer are operable under control of a control unit not shown. A cutting position of the cutting device **4** and a transport starting position of the film transport device **7** are staggered in a direction of film width.

At the exposure station **3**, the film **80** in each order and the printing paper **81** in strip form are arranged one over the other. The film **80** and printing paper **81** are transported with the surfaces thereof extending horizontally to a printing station not shown, where negative images of the film **80** are successively printed on the printing paper **81**. A monitor screen **10** is disposed in a front position of the apparatus for displaying exposure conditions of the negative images.

In this embodiment, a series of developed film **80** in each order is loaded into the apparatus. Alternatively, developed films **80** in a plurality of orders may be connected in series and formed into a roll to be loaded into the apparatus. Then, the films **80** are successively unwound from the roll to be printed on the printing paper **81**.

As shown in FIGS. **3** and **4**, the cutting device **4** includes a cutter **11** for cutting film **80**, two transport units **12** and **13** for elastically clasping from vertical directions and transporting the film **80** after a printing process at the printing station, and a frame counter, not shown, for counting frames in the film **80** transported by the transport units **12** and **13** past the cutting position of the cutter **11**. The two transport units **12** and **13** are opposed to each other across the cutting position of the cutter **11**. The downstream transport unit **13** includes idle rollers **14** for pressing the film **80** from above. These idle rollers **14** are retractable together to an inoperative position by a first rotary solenoid **83**.

Though not shown, a film transport path from the printing station to the cutter **11** includes a speed regulator for adjusting a difference in film processing speed between the printing station and the cutter **11**, a film sensor for detecting film **80**, and an image detector for detecting negative images recorded on the film **80**.

The film **80** in each order is transported by the upstream transport unit **12** after the printing process. A leading portion of the film **80** passes through the cutting position of the cutter **11** to be transported by the downstream transport unit **13**. When the count of frames having passed through the cutting position of the cutter **11** reaches a predetermined value, e.g. a multiple of **6**, the two transport units **12** and **13** are stopped and the idle rollers **14** of the downstream transport unit **13** are retracted to the inoperative position. Then, the film **80** held in place only by the upstream transport unit **12** is cut along a blank portion between two adjacent frames. In this way, a film piece **80***a* is cut off the film **80**.

The number of frames integrated by the frame counter is compared with the number of frames in each order detected by the image detector. The cutting device **4** is operated repeatedly until it is determined that the film **80** in each order has passed through the cutting position of the cutter **11**. When the film **80** in each order has passed through the cutting position of the cutter **11**, the operation of cutter **11** for that film **80** is stopped and the frame counter is reset.

Where developed films **80** in a plurality of orders are connected in series and formed into a roll to be processed, a joint between films **80** in different orders is detected. The number of frames in the film **80** in each order is counted and compared with the number of frames counted and integrated by the frame counter to control the operation of the cutting device **4**.

As shown in FIGS. **4** through **7**, the film collecting device **5** includes a stacker **16** for settling the film pieces **80***a* as stacked one upon the other in cartridges **15**. The downstream transport unit **13** acts also as a device for feeding the film pieces **80***a* into the cartridges **15**. The film collecting device **5** also includes a rear end sensor **70** for detecting rear ends of the film pieces **80***a* transported by the downstream transport unit **13**. The downstream transport unit **13** may fail to feed the film pieces **80***a* completely into the cartridges **15**. A rear end pusher **17** is provided for forcibly pushing rear ends of such film pieces **80***a* into the cartridges **15**. A cartridge moving device **18** moves the film pieces **80***a* loaded in the cartridges **15** in the direction of film width.

Each cartridge **15** has a trough-like shape, with a fixed cross section opening upward, elongated in a direction in which the film pieces **80***a* are fed. The cartridge **15** includes a first pair of upper right and left grooves **19** and a second pair of lower right and left grooves **20**. The first grooves **19** receive side edges of each film piece **80***a* fed by the downstream transport unit **13**. The second grooves **20** receive side edges of a plurality of film pieces **80***a* stacked. The film pieces **80***a* are inserted through an inlet end of the cartridge **15** where ends of the first grooves **19** are open, and pushed out through an outlet end of the cartridge **15** where ends of the second grooves **20** are open. Each cartridge **15** is placed relative to the cutter **11** such that a distance A between the inlet end of the cartridge **15** and the cutting position of the cutter **11** is shorter than each film piece **80***a*. Thus, as the downstream transport unit **13** transports uncut film **80**, the opposite side edges at a leading end of the film **80** enter the first grooves **19**.

The rear end pusher **17** is provided separately from the cartridges **15** and secured to an apparatus frame. The pusher **17** includes a pushing element **22** supported to be vertically pivotable about a pivotal axis **21** disposed below the second grooves **20**, a second rotary solenoid **84** for vertically swinging the pushing element **22**, and a return sensor **71** for detecting the pushing element **22** retracted to a standby position.

The stacker **16** also is provided separately from the cartridges **15** and secured to the apparatus frame. The stacker **16** includes an elongated pressing element **23** for pressing down each film piece **80***a* fitted in the first grooves **19** so that the opposite side edges thereof snap into the second grooves **20**, parallel links **24** for vertically movably supporting the pressing element **23**, a crank mechanism **25** for vertically reciprocating the pressing element **23**, a pressing motor **90** for driving the crank mechanism **25**, a reduction device **26** for operating the crank mechanism **25** at a predetermined rate, and a return sensor **72** for detecting the pressing element **23** retracted to a standby position. With each film piece **80***a* transferred from the first grooves **19** to the second grooves **20**, a subsequent film piece **80***a* is inserted into the first grooves **19** with ease.

The cartridge moving device **18** moves the film pieces **80***a* stacked in each cartridge **15**, along with the cartridge **15**, in the direction of film width toward the transport starting position of the film transport device **7**. The cartridge moving device **18** includes a cartridge guide **27** for guiding the

cartridges **15** along a predetermined loop path, and a cartridge drive **28** for intermittently driving the cartridges **15** supported by the cartridge guide **27** along the loop path.

The cartridge guide **27** has an endless chain **31** wound around sprockets **29** and a tension sprocket **30** supported by the apparatus frame. The cartridges **15** are connected to the endless chain **31** as arranged parallel to one another at predetermined intervals in the direction of film width. The cartridges **15** are movable under guiding action of the endless chain **31** along the loop path between a stacking position of the stacker **16** and the transport starting position of the film transport device **7**,

The cartridge drive **28** has a feed pawl **32** for engaging one of the cartridges **15** and intermittently moving the endless chain **31** by a distance B between adjacent cartridges **15**. A link mechanism **33** driven by a cartridge drive motor **91** advances the feed pawl **32** in predetermined timing. The cartridge **15** arriving at the stacking position of the stacker **16** is engaged and stopped by a lock pawl **34** attached to a swing arm **35** pivotable about a pivotal axis **40**. A pawl return sensor **73** is provided for detecting the feed pawl **32** in a standby position between cartridges **15**.

The link mechanism **33** includes parallel links **41** having a link element **37**, a pivot arm **42** pivotable by the cartridge drive motor **91**, and a drive link **43** for swinging the parallel links **41** with a pivotal movement of the pivot arm **42**. A press roller **36** is provided at a connection between the pivot arm **42** and the drive link **43** for pressing one end of the swing arm **35** having the lock pawl **34** to move the lock pawl **34** to a release position in predetermined timing.

The feed pawl **32** is pivotable about a pivotal axis **38** supported by the link element **37**, between an engaging position between adjacent cartridges **15** to engage one of these cartridges **15**, and a release position retracted from the cartridges **15**. The feed pawl **32** is biased toward the engaging position.

The swing arm **35** is movable between an engaging position for placing the lock pawl **34** in engagement with an end of one of the cartridges **15**, and a release position for canceling this engagement. The swing arm **35** is biased toward the engaging position.

A sequence of operation of the film collecting device **5** will be described next.

The film **80** transported by the downstream transport unit **13** toward the cartridges **15** is cut to film pieces **80***a* by the cutter **11**. When a detecting device, not shown, detects the cutter **11** returned to a standby position, the first rotary solenoid **83** is operated to move the idle rollers **14** to a pressing position, and the downstream transport unit **13** is driven to feed each film piece **80***a* along the first grooves **19** into one of the cartridges **15**. When the rear end sensor **70** detects the rear end of the film piece **80***a*, the second rotary solenoid **84** is operated to swing the pushing element **22** upward from the standby position. The pushing element **22** is returned to the standby position after forcibly pushing the rear end of the film piece **80***a* into the cartridge **15**.

Taking into account a time lag from detection of the rear end of the film piece **80***a* to pushing action of the pushing element **22**, the rear end sensor **70** is disposed in a position to detect the rear end of the film piece **80***a* immediately before the rear end passes the final idle roller **14**. Thus, the pushing element **22** applies the pushing action to the rear end of the film piece **80***a* after the rear end passes the final idle roller **14**.

The film piece **80***a* forcibly pushed into the cartridge **15** by the pushing element **22** could exit the cartridge **15** through the outlet end by inertia. However, the exit is prevented by a stopper **39** erected on the apparatus frame adjacent the outlet end of the cartridge **15**.

When the return sensor **71** detects the pushing element **22** retracted to the standby position, the pressing motor **90** of the stacker **16** is driven to cause the pressing element **23** to press down substantially a middle position transversely of the film piece **80***a* fitted in the first grooves **19** as shown in FIG. **7**(*a*). Then, as shown in FIG. **7**(*b*), the film piece **80***a* is curved and pushed toward the second grooves **20**. After the opposite side edges are fitted into the second grooves **20**, as shown in FIG. **7**(*c*), the pressing element **23** is retracted to the standby position. The pressing motor **90** is stopped when the return sensor **72** detects the pressing element **23** returned to the standby position.

Ultimately, the downstream transport unit **13** transport the final film piece **80***a* of the film group **80***b* in one order, i.e. the remainder of film **80** having passed the cutting position of the cutter **11** without being cut. When the stacker **16** places the final film piece **80***a* in the cartridge **15**, the cartridge moving device **18** is operated as shown in FIGS. **8**(*a*) through (*c*).

FIG. **8**(*a*) shows an initial state prior to operation of the cartridge moving device **18**. In this state, the lock pawl **34** engages the cartridge **15** staying in the stacking position of the stacker **16**, with the feed pawl **32** retracted to the standby position between adjacent cartridges **15**.

When the cartridge drive motor **91** is operated, as shown in FIG. **8**(*b*), the press roller **36** swings the swing arm **35** against the biasing force. As a result, the lock pawl **15** engaging the end of the cartridge **15** is moved to the release position, and the feed pawl **32** standing by between cartridges **15** is moved by action of the parallel links **41** to engage and push one of the cartridges **15**. By the feeding action of the feed pawl **32**, the cartridges **15** connected to the endless chain **31** move together along the loop path.

When the cartridge **15** engaged by the lock pawl **34** moves out of engagement with the lock pawl **34**, the lock pawl **34** returns to the engaging position. As the cartridges **15** move further on, a next, empty cartridge **15** upstream with respect to the direction of cartridge movement presses upon a contact surface **44** formed on the lock pawl **34** to move the lock pawl **34** to the release position against the biasing force.

The feed pawl **32** has a moving stroke determined by the action of the link mechanism **33**, which corresponds to the distance B between adjacent cartridges **15**. When the cartridges **15** have moved by the distance B, as shown in FIG. **8**(*c*), the empty cartridge **15** noted above lies in the stacking position of the stacker **16**. Then, the lock pawl **34** engages the empty cartridge **15**, and the feed pawl **32** is returned.

With the return of the feed pawl **32**, a contact surface **45** formed on the feed pawl **32** contacts one of the cartridges **15** upstream with respect to the direction of cartridge movement. By pushing action of this cartridge **15**, the feed pawl **32** pivots to the retracted position against the biasing force. Then, the feed pawl **32** overrides the end of the cartridge **15** back to the standby position.

The cartridge drive motor **91** is stopped when the pawl return sensor **73** detects the feed pawl **32** returned to the standby position. Subsequently, the film collecting device **5** is operated again to collect film **80** in the next order.

As described above, when the film group **80***b* in one order is collected in one cartridge **15**, the cartridge moving device **18** is operated to move the cartridge **15** from the stacking position of the stacker **16** by the distance B between adjacent cartridges **15**. At the same time, the next, empty cartridge **15**

upstream with respect to the direction of cartridge movement is moved to the stacking position of the stacker **16**. A film group **80***b* in a different order is collected in the empty cartridge **15**. Thus, the film pieces **80***a* in each different order are collected in one of the cartridges **15**.

The film transfer device **8** and film transport device **7** will be described next.

The cartridge moving device **18** stops when each cartridge **15** reaches a predetermined transfer position. Then, the film transfer device **8** transfers the film group **80***b* in one order from the cartridge **15** to the film transport device **7**. As shown in FIGS. **9** and **10**, the transfer device **8** includes a pushing plate **46** fixed to a pushing slide plate **47** for pushing the film group **80***b* in the cartridge **15** stopped in the transfer position, along the second grooves **20** toward the transport starting position of the film transport device **7**. The transfer device **8** further includes a driving slide plate **48** movable by a transfer drive motor **92**. The pushing slide plate **47** and driving slide plate **48** are guided by a pair of right and left guide shafts **49** and **50** to slide back and forth longitudinally of the cartridge **15**. A standby sensor **74** is provided for detecting the pushing plate **46** in a standby position, and a push completion sensor **75** for detecting the pushing plate **46** in a push completing position. The transfer drive motor **92** is operable in interlocked relationship with the cartridge moving device **18**.

One of the guide shafts **49** is fixed to the apparatus frame, while the other guide shaft **50** is supported by the apparatus frame to be axially movable relative thereto within a stroke range C until a rear end position of the guide shaft **50** contacts the apparatus frame. The driving slide plate **48** is connected to an endless belt **51** movable by the transfer drive motor **92** back and forth axially of the guide shafts **49** and **50**.

The pushing slide plate **47** has a channel-shaped construction opening upward, with the movable guide shaft **50** extending through front and rear vertical walls thereof. The driving slide plate **48** is mounted on the movable guide shaft **50** between the vertical walls of the pushing slide plate **47**. A compression coil spring **52** is mounted between the rear wall of the pushing slide plate **47** and the apparatus frame.

Compression coil springs **53** are mounted between a front end of the driving slide plate **48** and the front wall of the pushing slide plate **47** and between a rear end of the driving slide plate **48** and the rear wall of the pushing slide plate **47**, respectively. Thus, the driving slide plate **48** and pushing slide plate **47** are assembled to be movable together. Even if the driving slide plate **48** and pushing slide plate **47** move relative to each other, the two plates are reinstated in a predetermined relative position.

As shown in FIG. **11**, the film transport device **7** includes an endless chain **55** wound around sprockets **54** supported by the apparatus frame, a plurality of buckets **56** connected to the endless chain **55** and arranged at fixed intervals, and a bucket drive motor **93** for intermittently driving the endless chain **55** in predetermined timing. With movement of the endless chain **55**, the film transport device **7** transports the film group **80***b* transferred thereto to the film outlet **6** adjacent the printing paper collector **9**. The bucket drive motor **93** is operable in interlocked relationship with the cartridge moving device **18**.

Each bucket **56** is in the form of a flat tube for receiving a film group **80***b* inserted longitudinally thereof. The buckets **56** are connected to the endless chain **55** in a posture extending perpendicular to a direction of movement of the endless chain **55**. In the transfer position opposed to the cartridge **15**, each bucket **56** is maintained in a substantially horizontal posture so that its opening is directed to the cartridge **15**. After the film group **80***b* is transferred, the bucket **56** is gradually erected to transport the film group **80***b* in upright posture.

Each bucket **56** has a film-receiving depth smaller than the length of the film group **80***b*, so that one end of the film group **80***b* projects upward from the opening of the bucket **56**. This construction facilitates withdrawal of the film group **80***b* from the bucket **56**.

As shown in FIG. **10**, upper and lower flanged guide plates **57** and **58** are fixed to the apparatus frame between the cartridge **15** and the opening of the bucket **56** in horizontal posture in the transfer position. These guide plates **57** and **58** are disposed adjacent the outlet end of the cartridge **15** in the transfer position. This provision allows the film group **80***b* pushed out of the cartridge **15** to enter the bucket **56** smoothly. The upper guide plate **57** is divided into right and left plates arranged at opposite sides of a moving track of the pushing plate **46** and remote from the opening of the bucket **56**. The lower guide plate **58** extends to a position close to the opening of the bucket **56**. The lower guide plate **58** defines a cutout **59** for allowing entry of the pushing plate **46**.

The movable guide shaft **50** has a slide element **60** fixed to a forward end thereof projecting from the apparatus frame. The slide element **60** is slidably guided along the fixed guide shaft **49**. A guide plate **61** is fixed to a lower end of the slide element **60** for guiding an upper surface of the film group **80***b* into the bucket **56**.

A sequence of operation of the film transfer device **8** and film transport device **7** will be described next.

With operation of the cartridge drive motor **91**, the empty cartridge **15** having passed the film group **80***b* on to the film transport device **7** begins to move away from the transfer position. At the same time, the bucket drive motor **93** is operated to move the bucket **56** containing the film group **80***b* transfer thereto. The cartridge drive motor **91** and bucket drive motor **93** are stopped when a cartridge **15** containing a next film group **80***b* to be transferred and an empty bucket **56** reach the transfer position as shown in FIG. **10**(*a*).

When the cartridge drive motor **91** and bucket drive motor **93** are stopped, the transfer drive motor **92** is operated to move the pushing slide plate **47** with the driving slide plate **48** toward the bucket **56**. With the movement of the driving slide plate **48**, the pushing plate **46** pushes the film group **80***b* placed in the cartridge **15** standing still at the transfer position toward the bucket **56**. With the movement of the pushing slide plate **47**, the rear end thereof has an increasing distance from the apparatus frame. Consequently, the movable guide shaft **50** moves toward the bucket **56**, under the biasing force of the compression coil spring **52**, until the rear end thereof contacts the apparatus frame. The forward end of the guide plate **61** moving with the movable guide shaft **50** enters the bucket **56**.

The pushing plate **46** moves with the guide plate **61** fixed to the forward end of the movable guide shaft **50**, until the rear end of the movable guide shaft **50** contacts the apparatus frame. Therefore, the film group **80***b* pushed by the pushing plate **46** enters the bucket **56** after the forward end of the guide plate **61** enters the bucket **56**.

When the push completion sensor **75** detects the pushing plate **46** in the push completing position as shown in FIG. **10**(*b*), the transfer drive motor **92** is reversed. When the standby sensor **74** detects the pushing plate **46** in the standby

position, the transfer drive motor **92** is stopped to complete the operation to transfer the film group **80***b* to the bucket **56**.

Thus, a plurality of film groups **80***b* contained in the separate buckets **56** are arranged on a transport path, with a film group **80***b* in an order processed earlier being disposed ahead of the other. Each time the bucket drive motor **93** is operated, these film groups **80***b* are transported little by little toward the film outlet **6**.

The printing paper collector **9** includes a cutting device **62** for cutting to frames the printing paper **81** having undergone a printing process at the exposure station **3** and passed through a developing station not shown to be developed and dried, a sorting device **63** for sorting the cut printing paper **81** into printing paper groups **81***a* according to the orders from clients, and a paper transport device **65** for transporting the sorted printing paper groups **81***a* on a plurality of collecting shelves **64**. The paper transport device **65** has an endless chain **66** to which the collecting shelves **64** are connected at fixed intervals. Though not shown, a paper transport path from the printing station to the cutting device **62** includes a speed regulator for adjusting a difference in printing paper processing speed between the printing station and the cutting device **62**.

After the cut printing paper **81** is sorted as the printing paper group **81***a* in one order, this printing paper group **81***a* is transferred to an empty collecting shelf **64** standing still at the upper end of the transport path of the paper transport device **65**. After the transfer of this printing paper group **81***a,* the endless chain **66** is driven to move the collecting shelves **64** together. The endless chain **66** is stopped when a new empty collecting shelf **64** reaches the paper transfer position.

Thus, the collecting shelves **64** carrying the printing paper groups **81***a* are lowered gradually. A printing paper group **81***a* placed on a lower collecting shelf **64** is a printing paper group **81***a* in an order processed earlier than the other. Similarly, as noted herein before, a film group **80***b* disposed ahead of the other in the transport direction of the film transport device **7** is a film group **80***b* in an order processed earlier. Therefore, the film group **80***b* foremost in the transport direction of the film transport device **7** corresponds to the printing paper group **81***a,* foremost in the transport direction of the paper transport device **65**. That is, these groups **80***b* and **81***a* belong to the same order. The operator may successively check the film groups **80***b* with the printing paper groups **81***a,* and place these groups in packets order by order.

To avoid the film groups **80***b* and printing paper groups **81***a* being inadvertently left uncollected, a first bucket sensor **76** is provided for detecting any bucket **56** containing a film group **80***b* and having moved close to the terminal end of the transport path. When the first bucket sensor **76** detects a bucket **56** with a film group **80***b* remaining therein, an alarm such as a buzzer is operated to prompt the operator to remove the film group **80***b*.

Further, a second bucket sensor **77** is disposed downstream of the first bucket sensor **76** with respect to the bucket transport direction. When the second bucket sensor **77** detects a bucket **56** with a film group **80***b* remaining therein, the cutting device **4**, film collecting device **5** and film transfer device **8** are stopped. Upon lapse of a predetermined time from a bucket detection by the second bucket sensor **77**, all operations of the photographic printer including the exposure station **3** are stopped.

The foregoing embodiment may be modified as follows:

1. The film collecting device is not limited to a particular collecting mode. For example, film pieces may be collected in a vertical posture with film planes extending vertically.

2. The film collecting device is not limited to a particular collecting method. For example, film pieces may be collected while being moved in a direction of film width.

3. The film transport device is not limited to a particular transport mode with respect to the posture of film pieces transported. For example, the film pieces may be transported with film planes extending horizontally.

4. The moving device for moving film pieces in the direction of film width may be adapted to move the film pieces cut by the cutting device immediately from the cutting device. In this case, the film pieces may be collected after being moved in the direction of film width or while being moved in the direction of film width.

What is claimed is:

1. A photographic printer having an exposure station for exposing and printing images of photographic film on printing paper, said photographic printer comprising:

cutter means fur cutting said photographic film, after a printing process, to film pieces of a length having a predetermined number of frames; and

film collecting means for collecting said film pieces as sorted into separate orders;

said film collecting means including cartridges each for collecting said film pieces stacked vertically; and

said film collecting means further including feed means for feeding said film pieces cut by said cutter means into said cartridges, and a sensor for detecting rear ends of said film pieces fed by said feed means.

2. A photographic printer as defined in claim **1**, further comprising film transport means for transporting a group of said film pieces in each order collected by said film collecting means to a film outlet in a collected state.

3. A photographic printer as defined in claim **1**, wherein said film collecting means includes cartridges each for collecting said film pieces stacked vertically.

4. A photographic printer as defined in claim **1**, wherein said film collecting means further includes pushing means for forcibly pushing, into said cartridges, said rear ends of said film pieces failing to be contained in said cartridges by said feed means.

5. A photographic printer having an exposure station for exposing and printing images of photographic film on printing paper, said photographic printer comprising:

cutter means for cutting said photographic film, after a printing process, to film pieces of a length having a predetermined number of frames; and

film collecting means for collecting said film pieces as sorted into separate orders;

wherein said film collecting means includes cartridges each for collecting said film pieces stacked vertically; and

wherein each of said cartridges integrally defines first grooves and second grooves arranged vertically, said first grooves for receiving said film pieces, said second grooves for receiving said film pieces stacked vertically, said film pieces being inserted into each of said cartridges through an inlet end surface thereof where ends of said first grooves open, a group of said film pieces being pushed out of each of said cartridges through an outlet end surface thereof where ends of said second grooves open.

6. A photographic printer as defined in claim **5**, further comprising press means for pressing said film pieces in said first grooves from above to cause said film pieces to enter said second grooves.

7. A photographic printer as defined in claim 1, further comprising moving means for moving said film pieces cut by said cutter means, in a direction of film width, wherein said film transport means has a transport starting position staggered from a cutting position of said cutter means in said direction of film width.

8. A photographic printer having an exposure station for exposing and printing images of photographic film on printing paper, comprising:

cutter means for cutting said photographic film, after a printing process, to film pieces of a length having a predetermined number of frames; and

film collecting means for collecting said film pieces as sorted into separate orders;

wherein said film collecting; means includes cartridges each for collecting said films stacked vertically; and

said photographic printer further comprises cartridge guide means for guiding said cartridges along a predetermined loop path, and cartridge drive means for driving said cartridges supported by said cartridge guide means along said loop path.

9. A photographic printer as defined in claim 1, wherein said film transport means is constructed to transport said film pieces in a plurality of groups arranged on a transport path.

10. A photographic printer as defined in claim 1, wherein said film transport means includes a plurality of buckets for receiving said film pieces inserted in a longitudinal direction thereof, an endless chain for supporting said buckets connected thereto at fixed intervals, and a motor for intermittently driving said endless chain.

11. A photographic printer as defined in claim 1, further comprising printing paper collecting means for collecting, as sorted into said separate orders, said printing paper printed at said exposure station and then developed, wherein said film transport means is arranged to transport said film pieces toward a position adjacent said printing paper collecting means.

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